HENRY
Hydraulic Engineering Repository

Ein Service der Bundesanstalt für Wasserbau

Conference Poster, Published Version

Zorndt, Anna; Kösters, Frank

River runoff driven changes in sediment budgets and channel-shoal interaction in the Weser estuary

Verfügbar unter/Available at: https://hdl.handle.net/20.500.11970/105970

Vorgeschlagene Zitierweise/Suggested citation:
Zorndt, Anna; Kösters, Frank (2016): River runoff driven changes in sediment budgets and channel-shoal interaction in the Weser estuary. Poster präsentiert bei: Physics of Estuaries and Coastal Seas PECS 2016, , The Hague, October 9-14, 2016.

Standardnutzungsbedingungen/Terms of Use:

Die Dokumente in HENRY stehen unter der Creative Commons Lizenz CC BY 4.0, sofern keine abweichenden Nutzungsbedingungen getroffen wurden. Damit ist sowohl die kommerzielle Nutzung als auch das Teilen, die Weiterbearbeitung und Speicherung erlaubt. Das Verwenden und das Bearbeiten stehen unter der Bedingung der Namensnennung. Im Einzelfall kann eine restriktivere Lizenz gelten; dann gelten abweichend von den obigen Nutzungsbedingungen die in der dort genannten Lizenz gewährten Nutzungsrechte.

Documents in HENRY are made available under the Creative Commons License CC BY 4.0, if no other license is applicable. Under CC BY 4.0 commercial use and sharing, remixing, transforming, and building upon the material of the work is permitted. In some cases a different, more restrictive license may apply; if applicable the terms of the restrictive license will be binding.

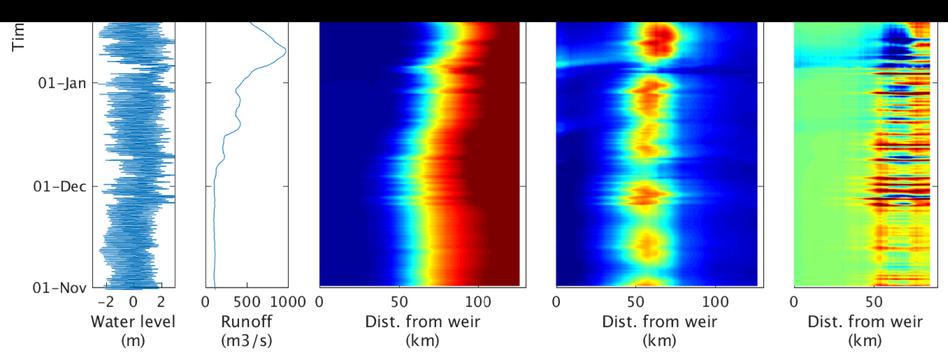

Figure 1: Water level, runoff, tidal and cross-sectional averages of salinity and ssc and residual suspended sediment transport for all fractions over time.

The modeled ssc reaches up to 500 mg/l. A strong spring-neap variation can be observed, which also shows in stationary turbidity measurements. The etm is located between km 40 and km 80 and is shifted downstream during river floods. This displacement may be slightly underestimated by the model, as turbidity measurements show an even higher seasonal variability.

The modeled residual suspended sediment transport ranges within +-20 T. t per tide, which is supported by adcp cross-section measurements. Downstream of km 50, there is sediment import during low runoff and export during the river floods. This seasonal variation can so far not be supported by measurements due to the small number of adcp cross-section surveys available. Another interesting phenomenon is the strong influence of the diurnal inequality.

Residual fluxes in the outer estuary and the etm zone

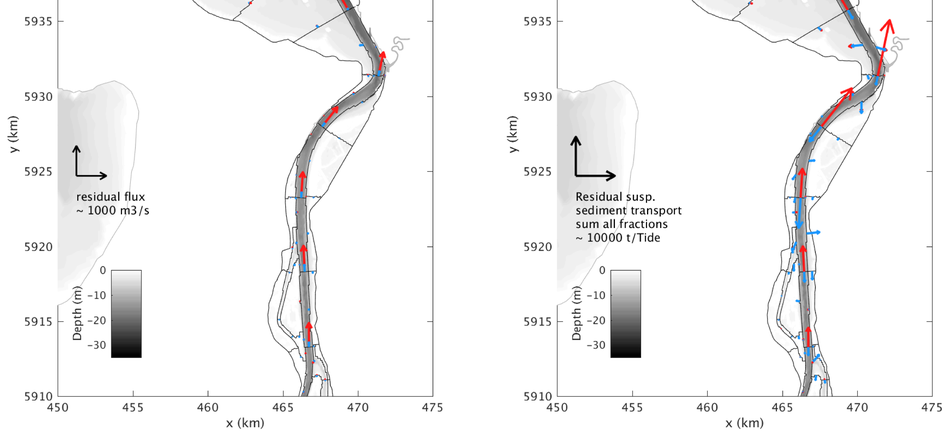

Figure 2: Residual water flux (left) and suspended sediment transport of all fractions (right) in the etm zone

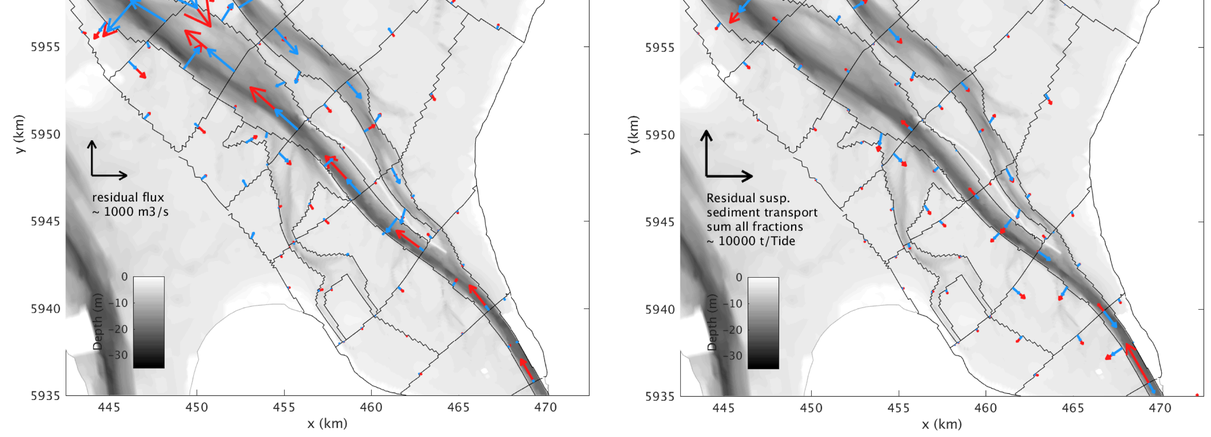

Figure 3: Residual water flux (left) and suspended sediment transport of all fractions (right) in the outer Weser estuary

While the net sediment fluxes depend strongly on river runoff in the inner estuary, the outer estuary fluxes are forced by geometry-based circulation patterns. To illustrate this, exact residual water fluxes and suspended sediment fluxes between morphodynamic units were computed for November (low runoff, Q ≃ 110 m^3/s) and January (high runoff, Q ≃ 760 m^3/s).
In the inner estuary, the residual water flux is directed downstream and its value corresponds to the average river runoff of the respective period (Figure 2, left). The residual suspended sediment transport is directed upstream during low runoff and downstream during high runoff (Figure 2, right).

In the outer estuary, the residual water fluxes reveal a distinct two channel system (Figure 3, left). In the flood channel, there is a dominant import of suspended sediments (Figure 3, right). In the ebb channel, which is the navigation channel, some areas show a low import and others even an export of suspended sediments. (The magnitudes and directions strongly depend on the settling velocities, not shown here.) The residual sediment transport pattern result from the geometry-constrained residual water circulation in the outer estuary. There is no strong runoff dependance in the outer estuary.

PECS, The Hague, 12.10.2016 • BAW, Wedeler Landstraße 157, 22587 Hamburg, Germany • Corresponding author: Anna Zorndt, +4940 81908-434, anna.zorndt@baw.de